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**SAW FILTERS, HERMETICALLY SEALED, SURFACE  
MOUNT, FREQUENCY RANGE 10MHz - 4GHz**

**ESCC Detail Specification No. 3502/002**

Issue 3	February 2016
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DCR No.	CHANGE DESCRIPTION
960	Specification upissued to implement changes per DCR.

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## 1 GENERAL

### 1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

### 1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. 3502.
- (b) MIL-STD-883, Test Methods and Procedures for Microelectronics.
- (c) ESCC-Q-ST-70-38, High-reliability soldering for surface mount and mixed technology.

### 1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

### 1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

#### 1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 350200201S#####

- Detail Specification Reference: 3502002
- Component Type Variant Number: 01 (as required)
- Manufacturer Specific SAW Filter Identification: S##### (as applicable), where S##### is a unique code allocated by the Manufacturer to a specific SAW Filter design.

#### 1.4.2 Component Type Variants

The component type variants applicable to this specification are as follows:

Variant Number	Case Type Code Letter	Terminal Material and / or Finish (Note 2)	Weight max g
01	A	D2	(Note 1)
02	B	D2	(Note 1)
03	C-1	D2	(Note 1)
04	C-2	D2	(Note 1)
05	D	2	(Note 1)
06	E	D2	(Note 1)
07	F-1	D2	(Note 1)
08	F-2	D2	(Note 1)
09	G-1	D2	(Note 1)
10	G-2	D2	(Note 1)
11	H	D2	(Note 1)
12	I	D2	(Note 1)
13	J-1	D2	(Note 1)
14	J-2	D2	(Note 1)
15	J-3	D2	(Note 1)

**NOTES:**

1. The maximum weights of the individual SAW Filters are given in the applicable SAW Filter Data Sheets.
2. The terminal material and/or finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

#### 1.4.3 Manufacturer Specific SAW Filter Identification

A SAW Filter Data Sheet shall be produced by the Manufacturer following negotiation with the Orderer that, as a minimum, specifies all the requirements unique to the specific SAW Filter design that are identified herein as being specified in a SAW Filter Data Sheet. The SAW Filter Data Sheet shall be held under configuration control by the Manufacturer.

For identification and traceability purposes the Manufacturer shall allocate a unique Manufacturer Specific SAW Filter Identification to the SAW Filter Data Sheet and the specific SAW Filter design, as specified in The ESCC Component Number herein.

### 1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Device RF Input Power (Continuous)	$P_{RF}$	See SAW Filter Data Sheet	dBm	Note 1
Operating Temperature Range	$T_{op}$	See SAW Filter Data Sheet	°C	$T_{case}$
Storage Temperature Range	$T_{stg}$	See SAW Filter Data Sheet	°C	$T_{case}$
Soldering Temperature	$T_{sol}$	+330	°C	Note 2

#### NOTES:

1. Guaranteed maximum input level for an operating time  $\leq 24$  hours. Degradation of performance may occur if the specified Maximum Continuous RF Input Power is applied for periods longer than 24 hours. A derating of 6dBm from the specified Maximum Continuous RF Input Power must be applied under normal operating conditions.
2. Duration 10 seconds maximum at a distance of not less than 1.6mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.

### 1.6 HANDLING PRECAUTIONS

These devices are susceptible to damage by electrostatic discharge. Therefore, suitable precautions shall be employed for protection during all phases of manufacture, testing, packaging, shipment and any handling.

These devices must not be subjected to any DC Voltage.

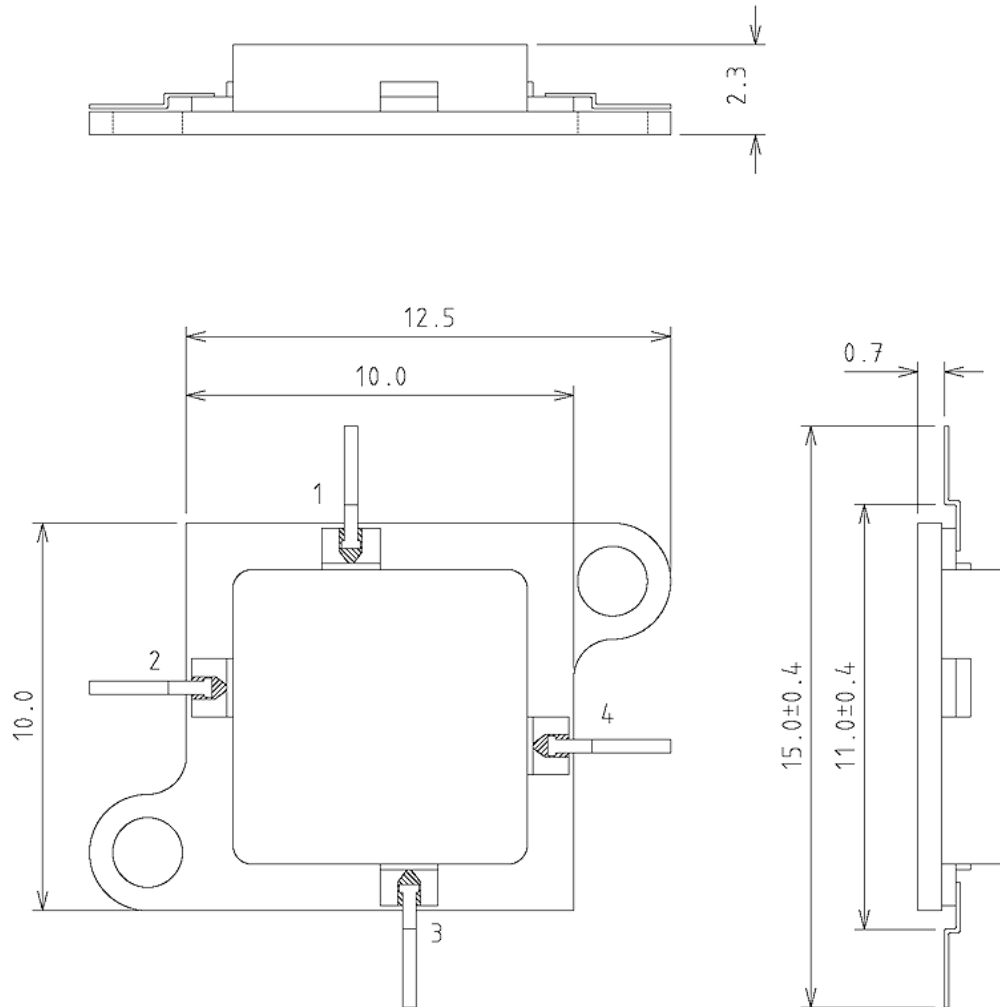
These components are categorised as Class 1 per ESCC Basic Specification No. 23800.



1.7 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

For all package types, the base of the package is a ground terminal. The base of the package must be connected to GND in order to achieve the electrical performance specified in the applicable SAW Filter Data Sheet.

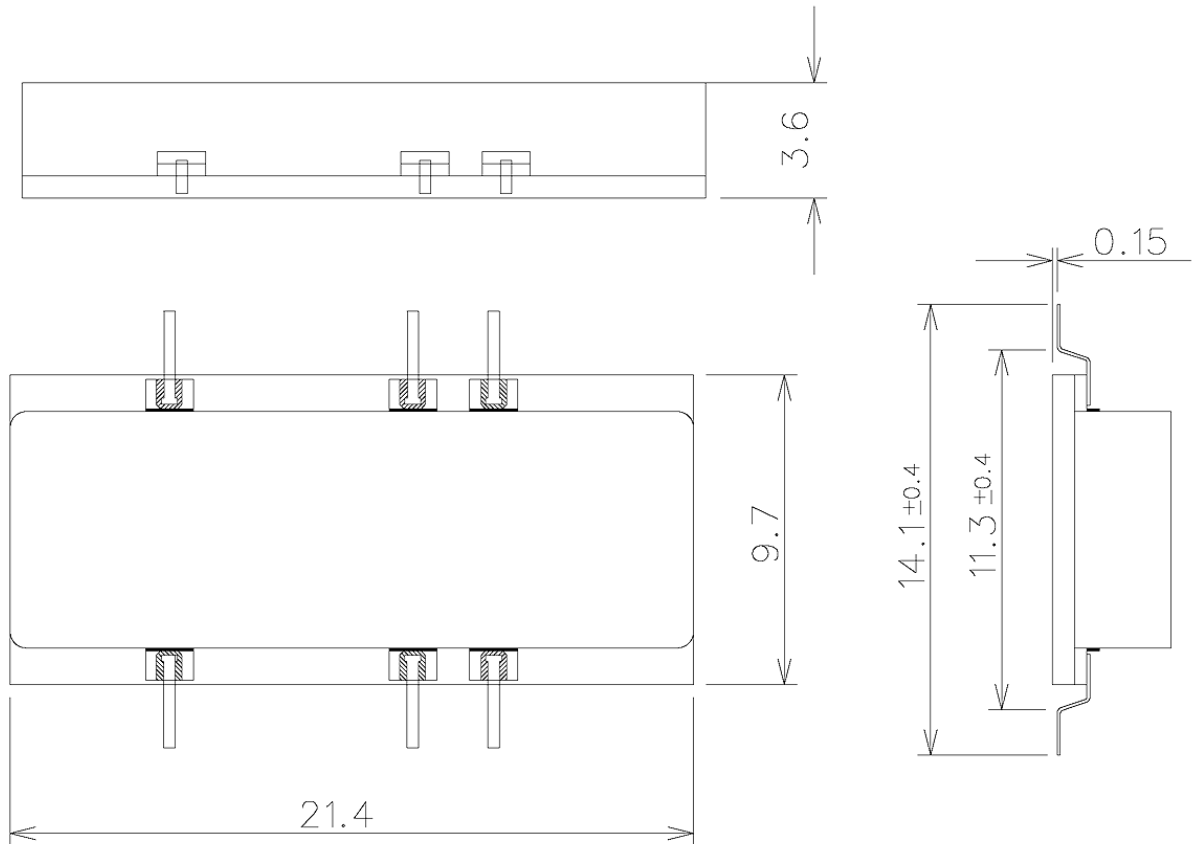
1.7.1 Type A : 4 Gullwing Stripline Terminals



**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of ±0.15mm.
3. Terminal identification:
  - 1 - Input
  - 2 - Input Return
  - 3 - Output Return
  - 4 - Output

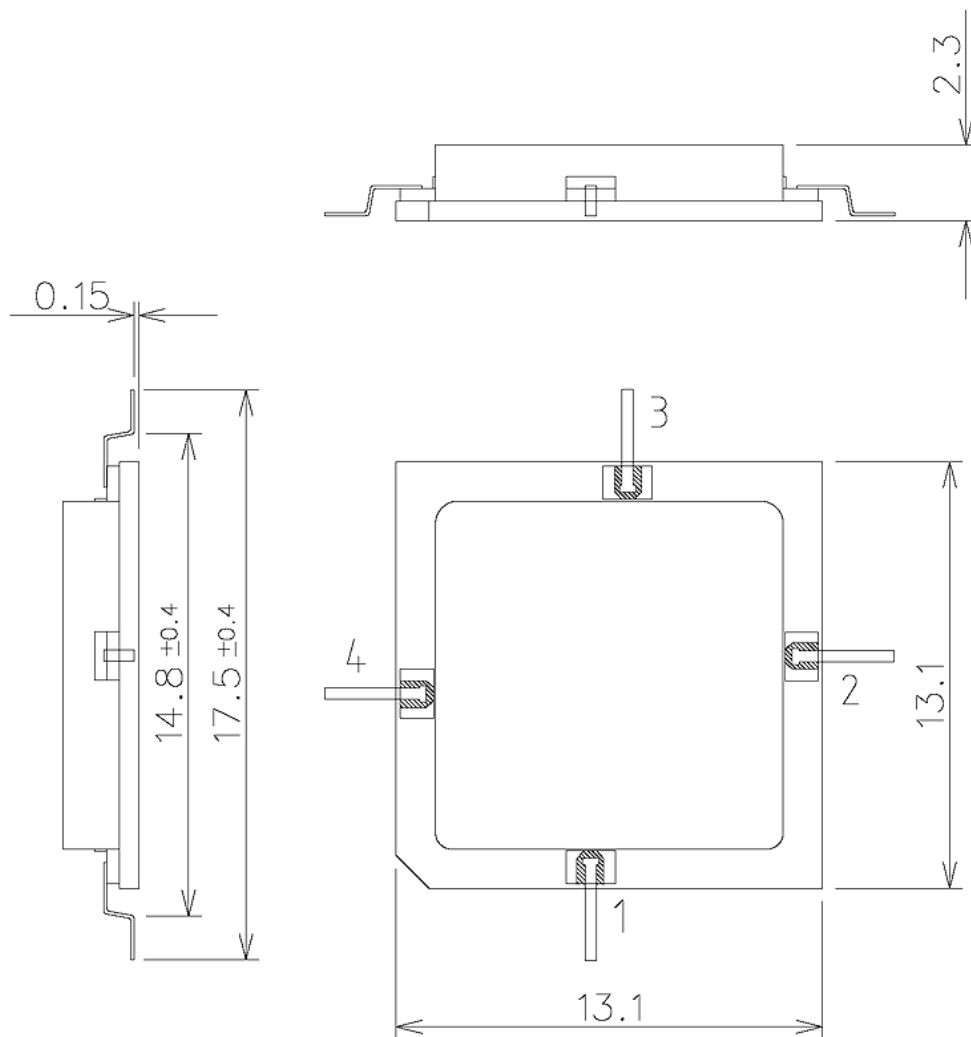
1.7.2 Type B : 6 Gullwing Stripline Terminals



**NOTES:**

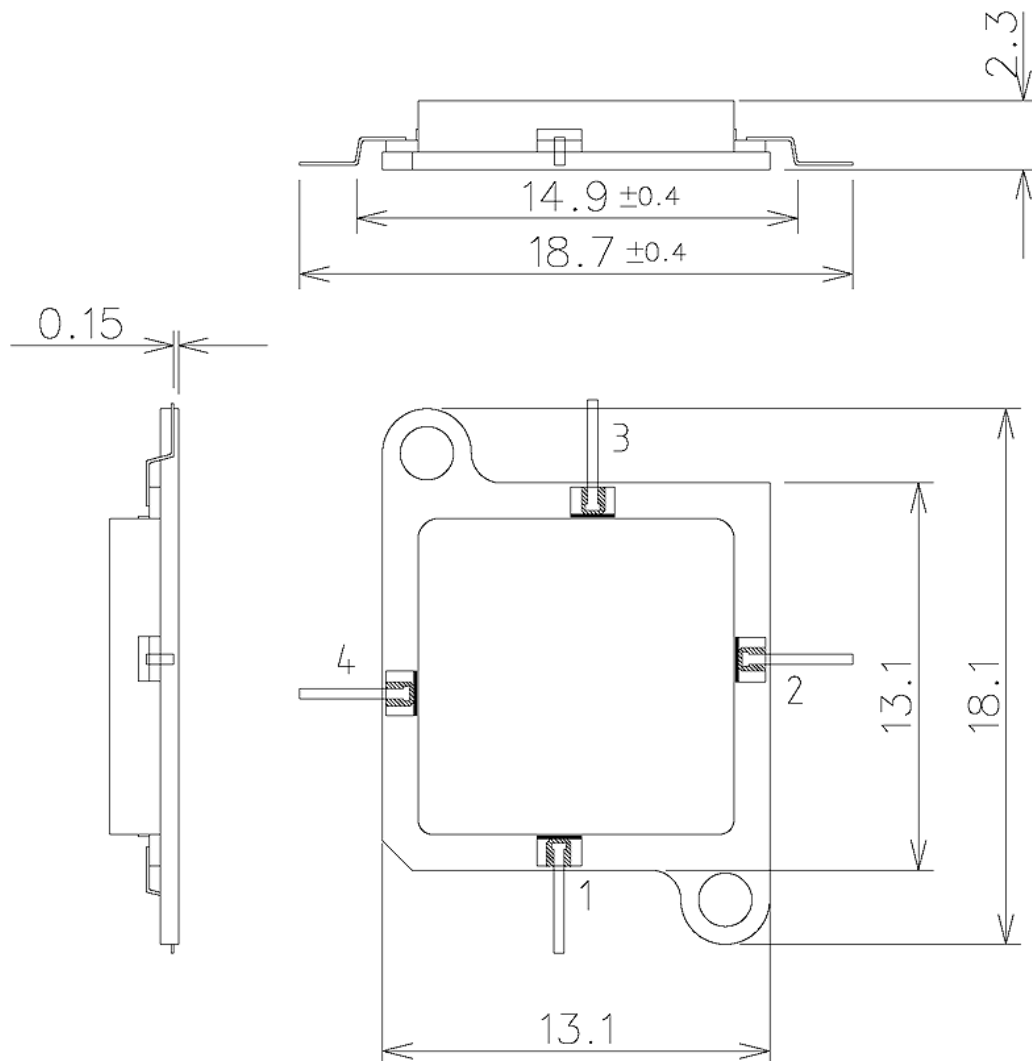
1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of ±0.15mm.
3. Terminal identification is not applicable (the numbering and assignment of the terminals is dependent on the specific SAW Filter design.)

1.7.3 Type C-1 : 4 Gullwing Stripline Terminals



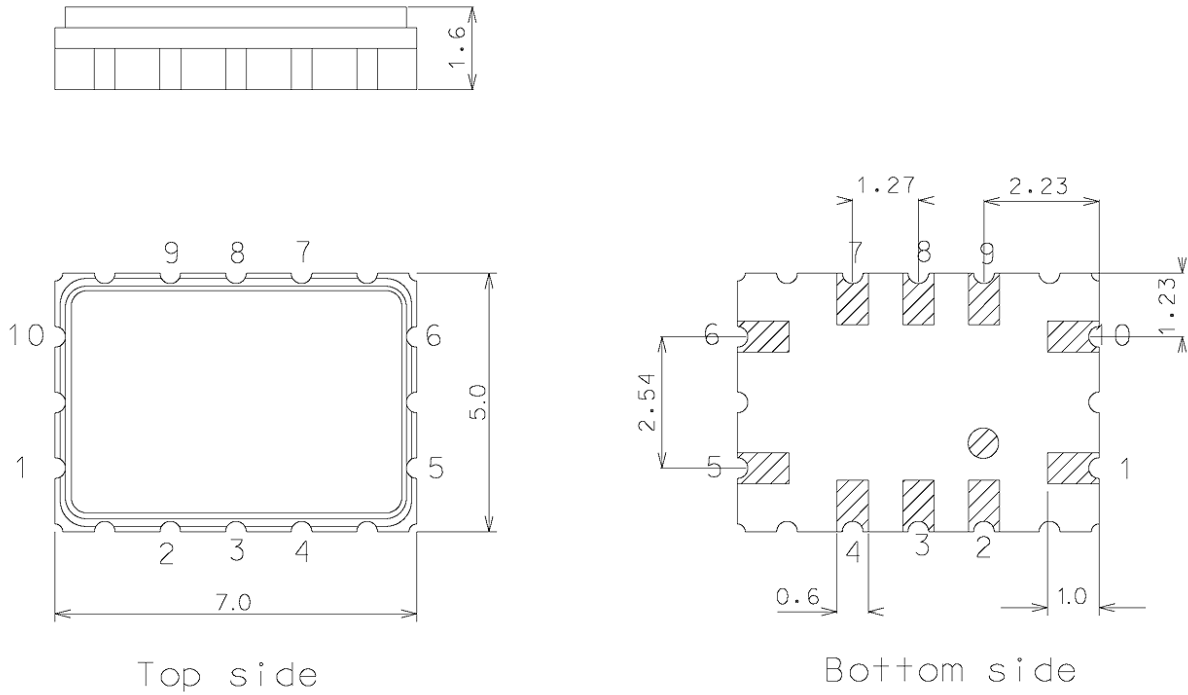
**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.15$  mm.
3. Terminal identification:
  - 1 - Input
  - 2 - Input Return
  - 3 - Output Return
  - 4 - Output

1.7.4 Type C-2 : 4 Gullwing Stripline Terminals**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.15$ mm.
3. Terminal identification:
  - 1 - Input
  - 2 - Input Return
  - 3 - Output Return
  - 4 - Output

1.7.5 Type D : 10 Terminals

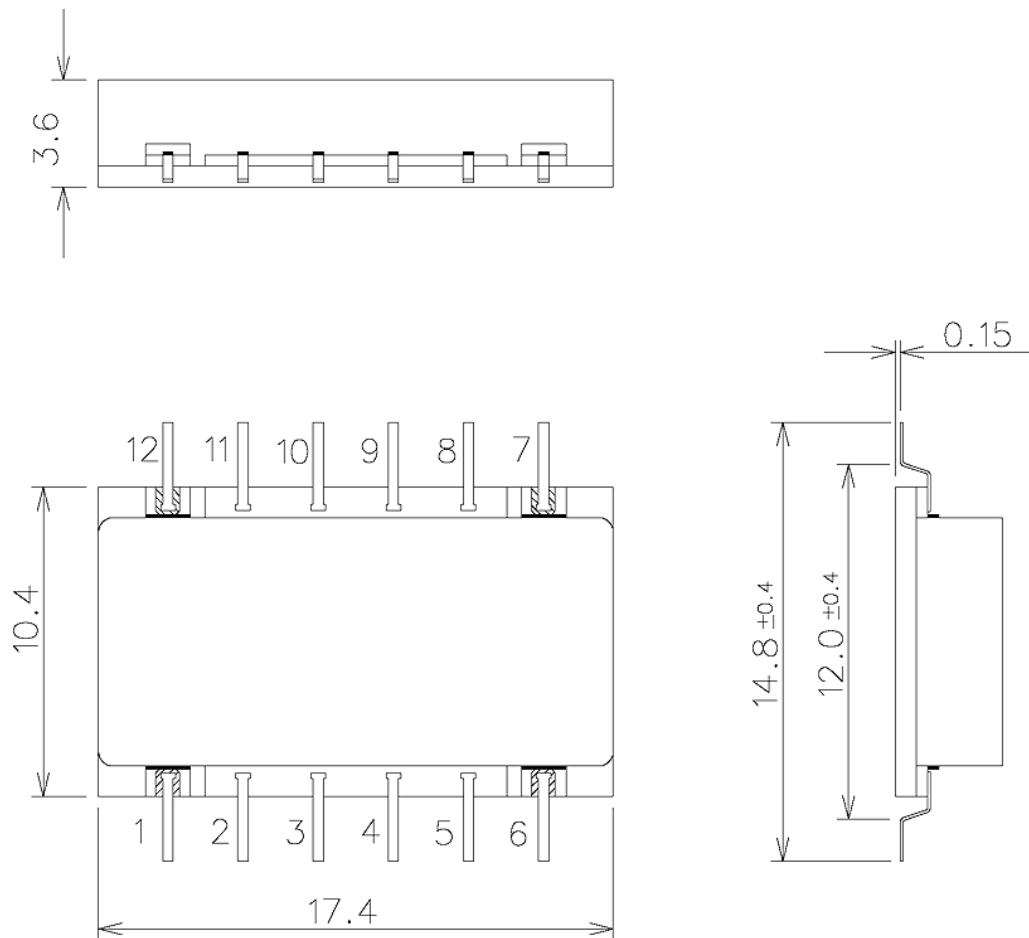


**NOTES:**

1. All dimensions are in millimetres.
2. The tolerance on all dimensions is  $\pm 0.15$ mm.
3. Terminal identification is dependent on the configuration of the SAW Filter.
  - (a) Differential input and output:
    - 1 - Input Return
    - 2, 3, 4, 7, 8, 9 - GND
    - 5 - Output
    - 6 - Output Return
    - 10 - Input
  - (b) Differential input, single ended output:
    - 1 - Input Return
    - 2, 3, 4, 6, 7, 8, 9 - GND
    - 5 - Output
    - 10 - Input
  - (c) Single-ended input, differential output:
    - 1, 2, 3, 4, 7, 8, 9 - GND
    - 5 - Output
    - 6 - Output Return
    - 10 - Input

For all configurations, terminals 2, 3, 4 and 7, 8, 9 are internally connected.

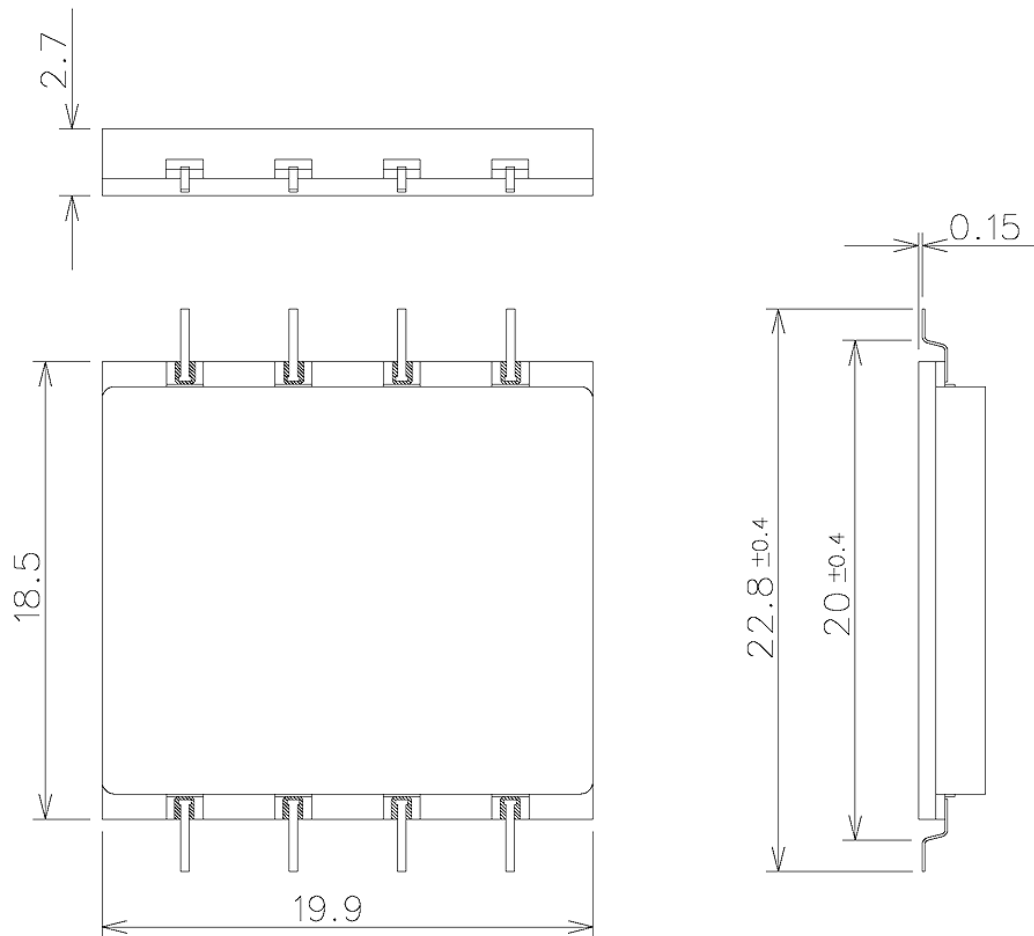
1.7.6 Type E : 12 Gullwing Stripline Terminals



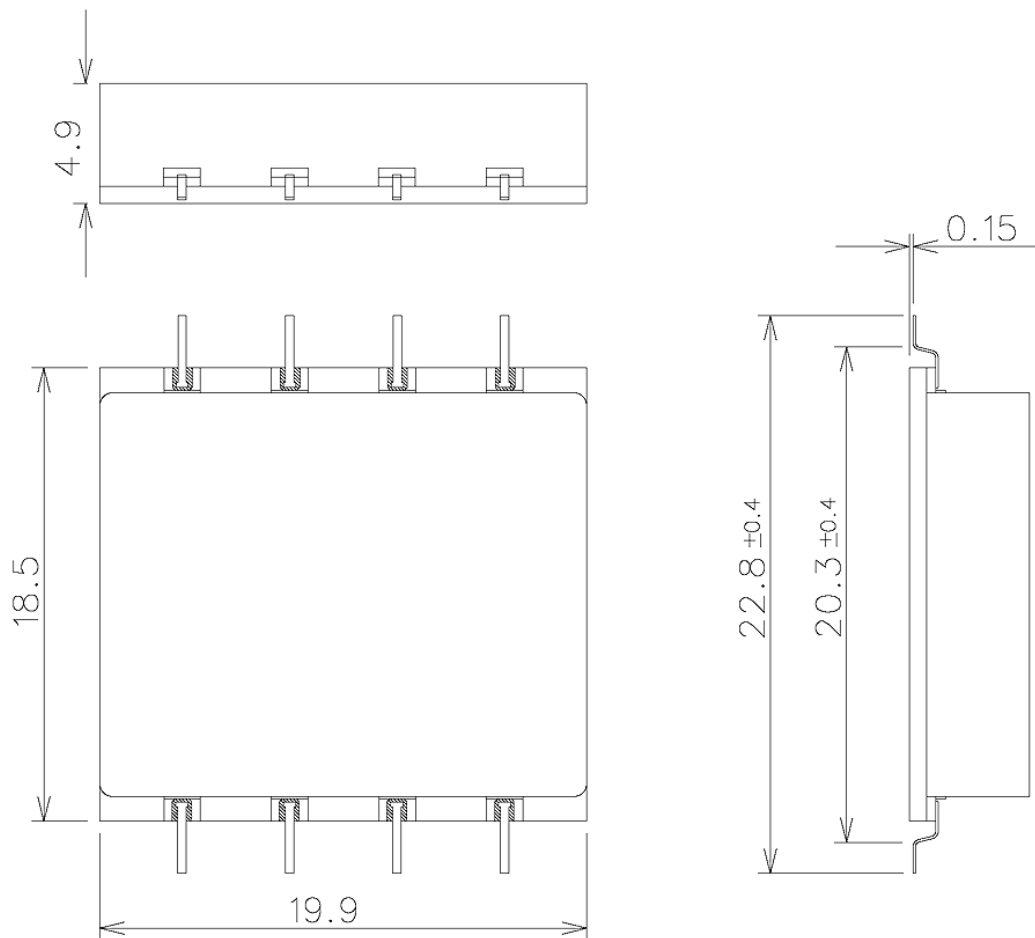
**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of ±0.15mm.
3. Terminal identification:
  - 1, 12 - Input
  - 2, 3, 4, 5, 8, 9, 10, 11 - GND
  - 6, 7 - Output

### 1.7.7 Type F-1 : 8 Gullwing Stripline Terminals

**NOTES:**

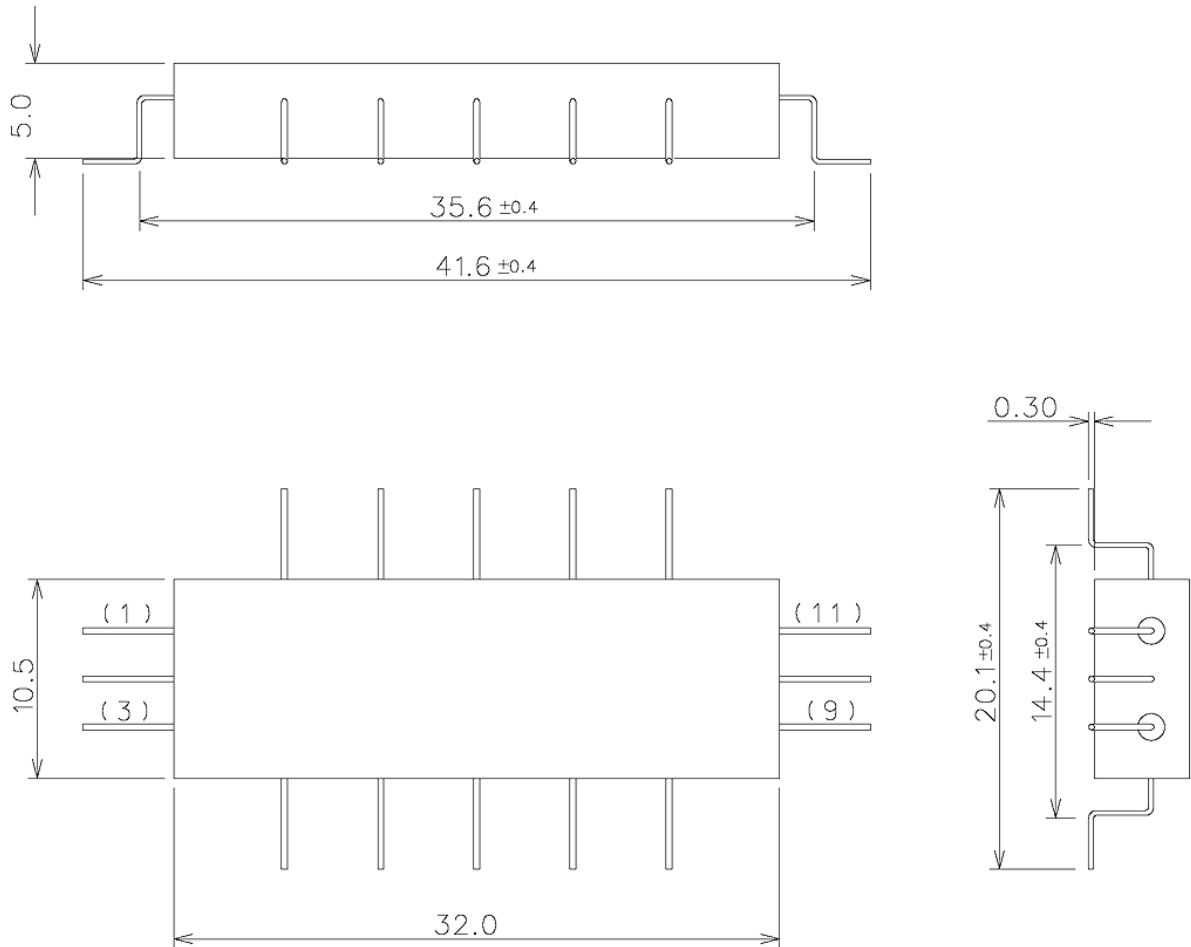
1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.15$ mm.
3. Terminal identification is not applicable (the numbering and assignment of the terminals is dependent on the specific SAW Filter design.)

1.7.8 Type F-2 : 8 Gullwing Stripline Terminals**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.15$ mm.
3. Terminal identification is not applicable (the numbering and assignment of the terminals is dependent on the specific SAW Filter design.)



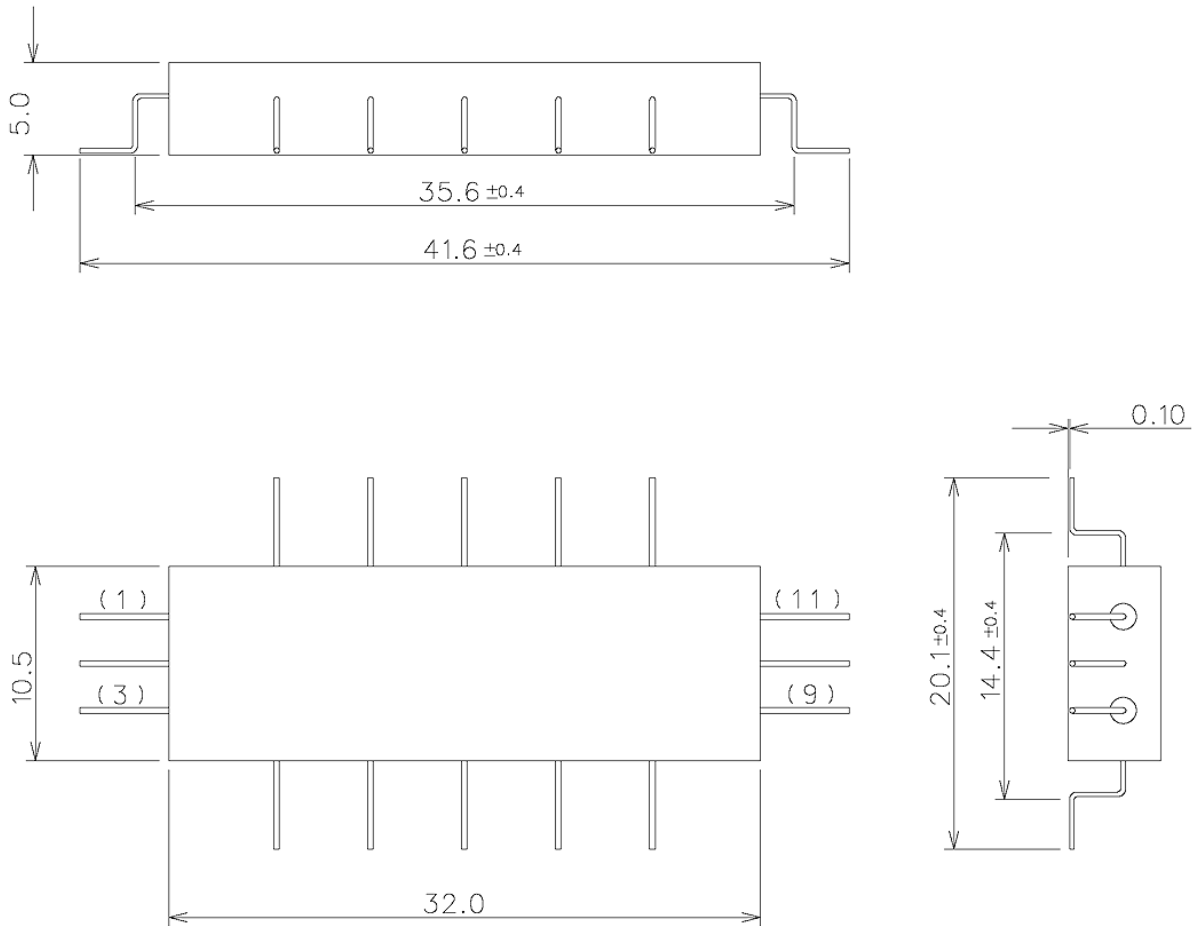
1.7.9 Type G-1 : 16 Pre-formed Stripline Terminals



**NOTES:**

1. All dimensions are in millimetres.
  2. Unless otherwise specified, terminal dimensions/positions have a tolerance of ±0.2mm and package dimensions have a tolerance of ±0.13mm.
  3. Terminal identification:
    - 1 - Input
    - 2, 4, 5, 6, 7, 8, 10, 12, 13, 14, 15, 16 - GND
    - 3 - Input Return
    - 9 - Output Return
    - 11 - Output
- Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.
4. All 16 terminals shall be pre-formed prior to their assembly into the package body. The terminals on all four sides of the package shall be pre-formed in the same manner.

1.7.10 Type G-2 : 16 Formed Stripline Terminals

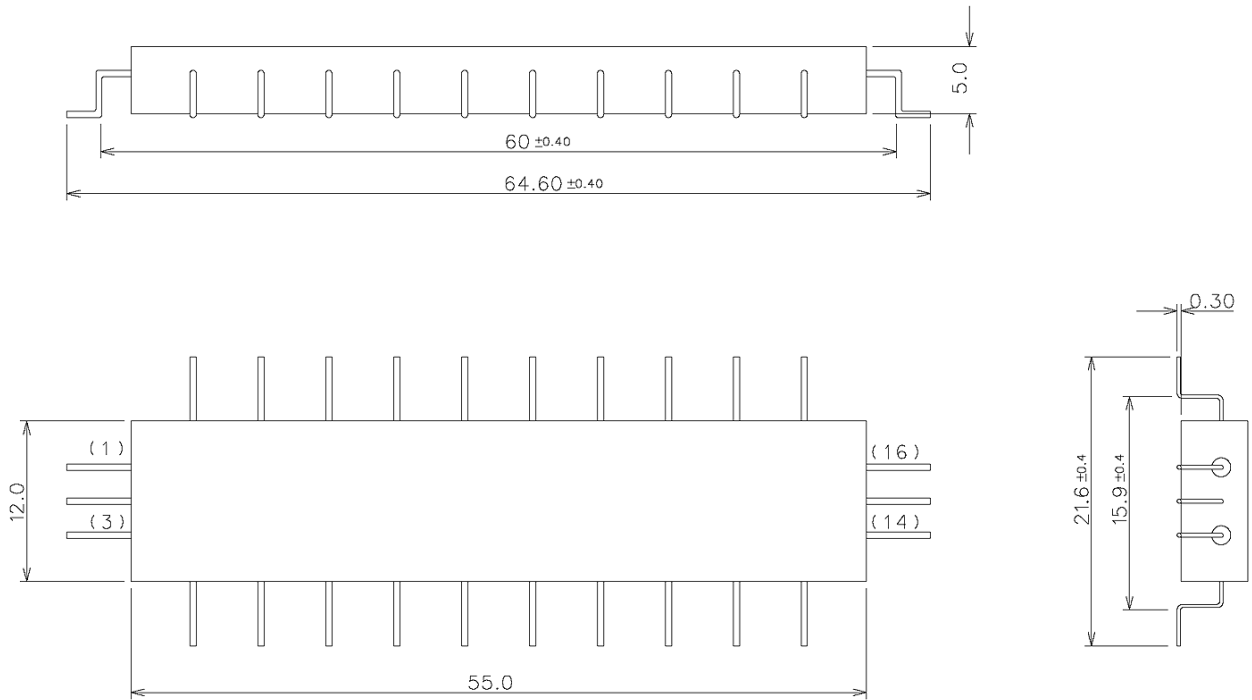


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified, terminal dimensions/positions have a tolerance of  $\pm 0.2\text{mm}$  and package dimensions have a tolerance of  $\pm 0.13\text{mm}$ .
3. Terminal identification:
  - 1 - Input
  - 2, 4, 5, 6, 7, 8, 10, 12, 13, 14, 15, 16 - GND
  - 3 - Input Return
  - 9 - Output Return
  - 11 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.7.11 Type H : 26 Formed Stripline Terminals

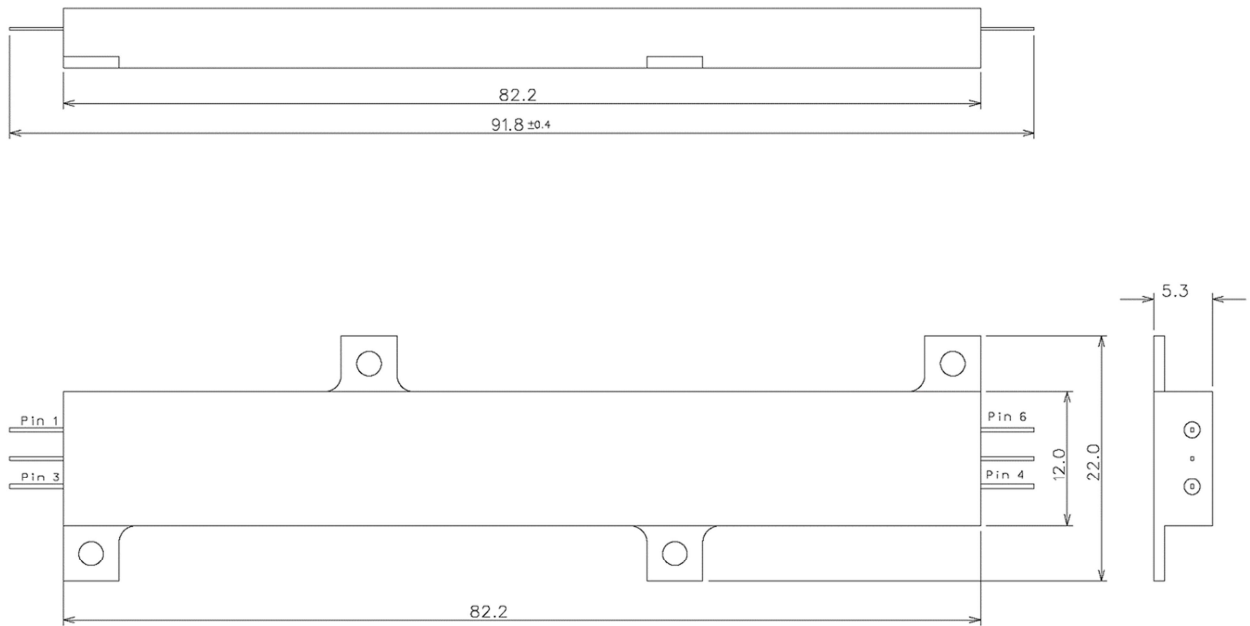


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified, terminal dimensions/positions have a tolerance of  $\pm 0.2$ mm and package dimensions have a tolerance of  $\pm 0.13$ mm.
3. Terminal identification:
  - 1 - Input
  - 2, 4, 5, 6, 7, 8, 10, 12, 13, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 - GND
  - 3 - Input Return
  - 14 - Output Return
  - 16 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.7.12 Type I : 6 Stripline Terminals

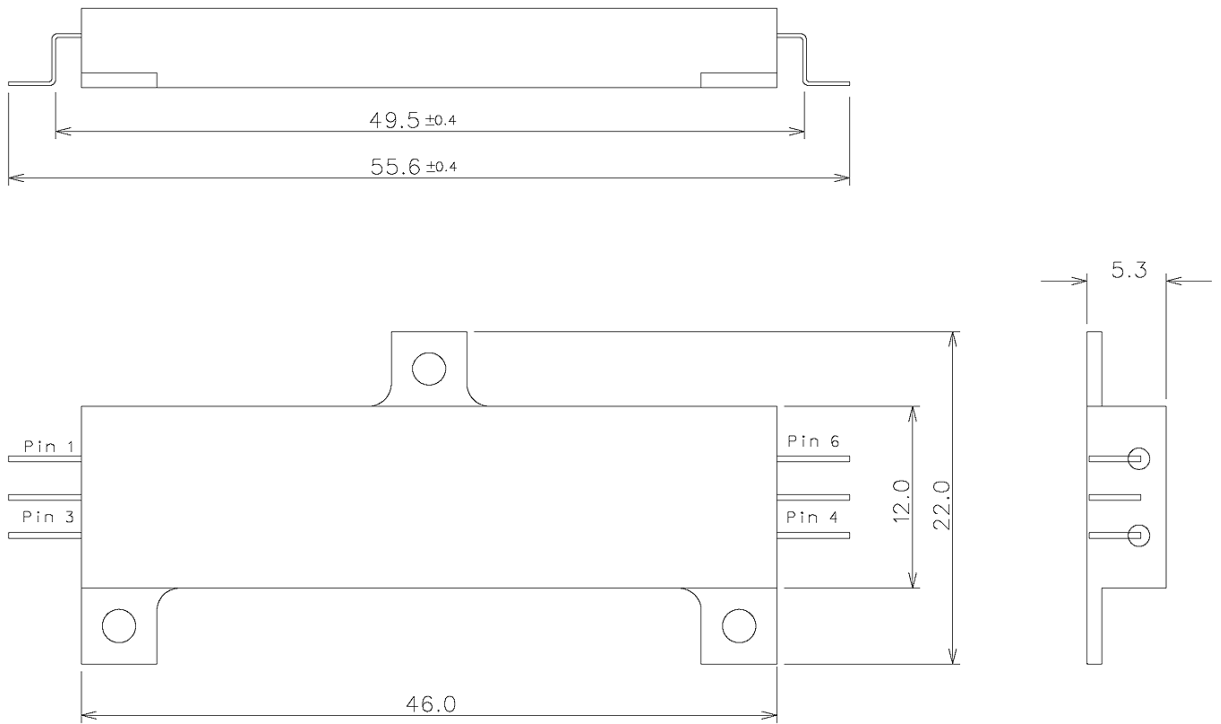


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.13$ mm.
3. Terminal identification:
  - 1 - Input
  - 2, 3, 4, 5 - GND
  - 6 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.7.13 Type J-1 : 6 Formed Stripline Terminals

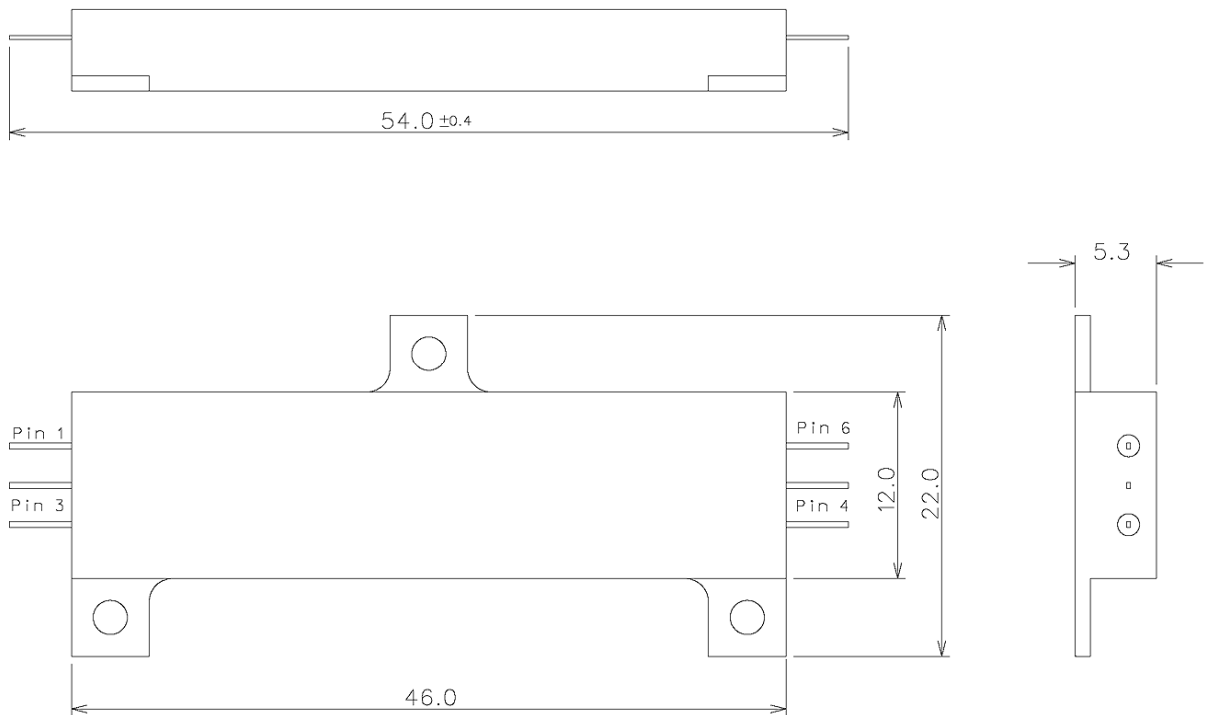


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.13$ mm.
3. Terminal identification:
  - 1 - Input
  - 2, 5 - GND
  - 3 - Input Return
  - 4 - Output Return
  - 6 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.7.14 Type J-2 : 6 Stripline Terminals

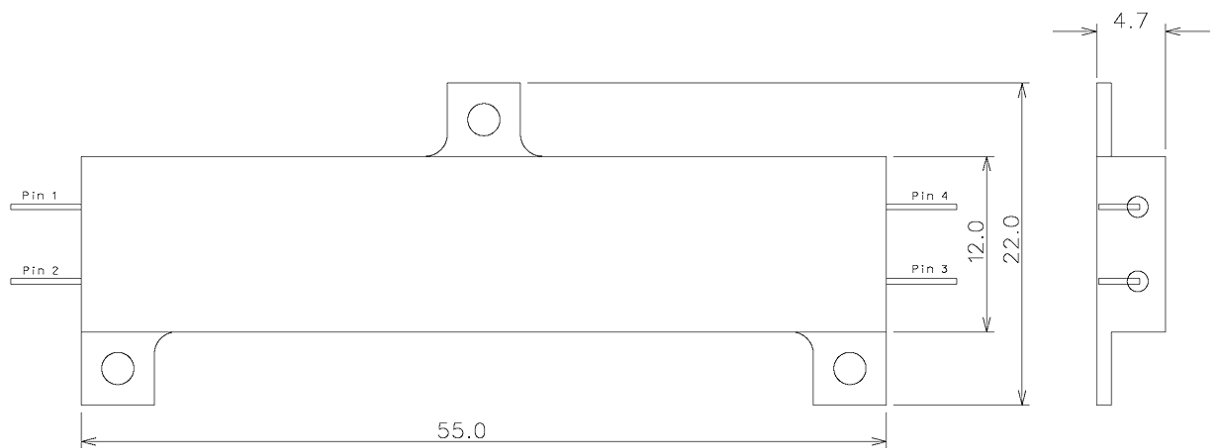
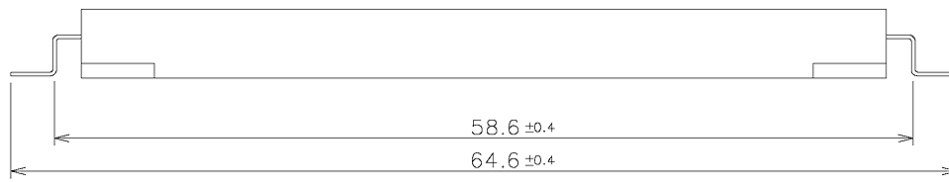


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.13$ mm.
3. Terminal identification:
  - 1 - Input
  - 2, 3, 4, 5 - GND
  - 6 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.7.15 Type J-3 : 4 Stripline Terminals

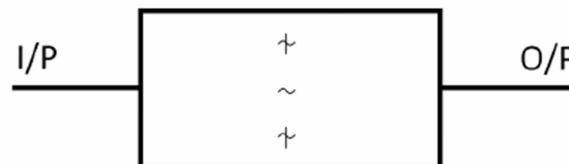


**NOTES:**

1. All dimensions are in millimetres.
2. Unless otherwise specified dimensions have a tolerance of  $\pm 0.13\text{mm}$ .
3. Terminal identification:
  - 1 - Input
  - 2 - Input Return
  - 3 - Output Return
  - 4 - Output

Terminal No. 1 may be identified by means of a coloured glass feed-through in addition to the top marking.

1.8 FUNCTIONAL DIAGRAM



1.9 PIN ASSIGNMENT

The pin assignment shall be defined in each individual SAW Filter Data Sheet.

**2 REQUIREMENTS**

**2.1 GENERAL**

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

**2.1.1 Deviations from the Generic Specification**

None.

**2.2 MARKING**

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

- (a) Lead Identification.
- (b) The ESCC Qualified Component Symbol (for ESCC qualified components only).
- (c) The ESCC Component Number.
- (d) Traceability information.

**2.3 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES**

Electrical measurements shall be performed at room, high and low temperatures. The characteristics to be measured vary depending on the particular SAW Filter. Therefore, typical characteristics are given below and the specific characteristics to be measured shall be defined in each individual SAW Filter Data Sheet.

**2.3.1 Room Temperature Electrical Measurements**

The measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

Characteristics	Symbols	MIL-STD-883 Test Method	Test Conditions Note 1	Limits		Units
				Min	Max	
Centre Frequency	$f_c$	-	See SAW Filter Data Sheet			MHz
In-band Ripple, $f_L$ to $f_U$	-	-	See SAW Filter Data Sheet			dB(p-p)
Insertion Loss	IL	-	See SAW Filter Data Sheet			dB
Phase Linearity, $f_L$ to $f_U$	-	-	See SAW Filter Data Sheet			°(p-p)
Out-of-band Rejection	-	-	See SAW Filter Data Sheet			dB

**NOTES:**

1. All measurements shall be made with the use of external matching networks.



2.3.2 High and Low Temperatures Electrical Measurements

The measurements shall be performed at the High and Low temperatures defined in each individual SAW Filter Data Sheet. Unless otherwise specified the characteristics, test methods, conditions and limits shall be the same as specified for Room Temperature Electrical Measurements.

2.4 PARAMETER DRIFT VALUES

Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values ( $\Delta$ ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits		Units	
		Drift Value $\Delta$	Absolute		
			Min		Max
Centre Frequency (at -6dB)	$f_c(-6dB)$	See SAW Filter Data Sheet		MHz	
Insertion Loss	IL	See SAW Filter Data Sheet		dB	

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ . Unless otherwise specified the characteristics, test methods, conditions and limits shall be the same as specified for Room Temperature Electrical Measurements.

2.6 BURN-IN CONDITIONS

As specified in Burn-in in the Generic Specification.

2.7 OPERATING LIFE CONDITIONS

As specified in Operating Life in the Generic Specification.

**APPENDIX A****AGREED DEVIATIONS FOR KONGSBERG NORSPACE AS (NORWAY)**

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 2.1.1, Deviations from the Generic Specification	Chart F3 – Screening Tests: Radiographic Inspection shall not be performed.
	Paragraph 5.1.1 – Rebonding: Wire re-bonding is allowed within the following limitations: (i) All re-bonds shall be placed on undisturbed metal (ii) The total number of pin to substrate or substrate-to-substrate wire re-bondings shall be limited to a maximum of 10% of the total number of wires in the SAW device.
	Paragraph 8.6 – Seal: MIL-STD-883, Test Method 1014, condition CH <sub>2</sub> shall be employed for both Fine and Gross Leak.